

## CLAIMS

1. A system facilitating measurement and control of refractive index of an immersion medium, comprising:
  - a component that measures one or more parameters of the immersion medium, the one or more parameters relating to refractive index of the immersion medium; and
  - a component that effectuates modification of the one or more parameters of the immersion medium based at least in part upon the one or more measured parameters, wherein modification of the one or more parameters effectuates control of the refractive index of the immersion medium.
2. The system of claim 1, the immersion medium being at least one of water, perfluorinated polyether, ozone vapor, and supercritical fluid in gaseous phase.
3. The system of claim 1, wherein the parameters of the immersion medium comprise at least one of refractive index ( $n$ ) and lithographic constant ( $k$ ).
4. The system of claim 1, further comprising a substrate upon which a known grating structure is built, wherein the substrate is subject to a semiconductor manufacturing process *via* the immersion medium.
5. The system of claim 4, the substrate at least partially immersed within the immersion medium.
6. The system of claim 4, further comprising a final optical component at least partially within the immersion medium.
7. The system of claim 4, wherein the substrate is one of a wafer, wafer stage, and reticle.

8. The system of claim 4, wherein the component that measures one or more parameters of the immersion medium comprises a source that emits an incident beam through the immersion medium onto the substrate and a detector operative to detect at least one of reflected and diffracted beams.
9. The system of claim 1, wherein the parameters modified are at least one of temperature and pressure.
10. The system of claim 1, wherein modification of one or more parameters of the immersion medium includes replacing the immersion medium.
11. The system of claim 1, further comprising an artificial intelligence component.
12. A system comprising:
  - means for measuring refractive index of an immersion medium; and
  - means for controlling refractive index of an immersion medium utilizing information obtained by the means for measuring refractive index of an immersion medium.
13. The system of claim 12, further comprising means for emitting an incident light beam through an immersion medium and onto a known grating structure upon a substrate.
14. The system of claim 13, further comprising means for detecting at least one of reflected and diffracted light in response to interaction of the incident light beam, the immersion medium and the substrate.
15. The system of claim 14, further comprising means for deriving at least one of refractive index and lithographic constant utilizing detected light and known grating structure.

- 16. A method for measuring and controlling refractive index of an immersion medium comprising:
  - emitting an incident light beam through an immersion medium and onto a substrate upon which a known grating structure is built; and
  - detecting at least one of reflected and diffracted light in response to the incident light beam interacting with the substrate and immersion medium.
- 17. The method of claim 16, further comprising utilizing a scatterometry technique to discern optical characteristics of the detected light.
- 18. The method of claim 17, further comprising employing optical characteristics and known grating structure to determine immersion medium characteristics.
- 19. The method of claim 18, further comprising adjusting immersion medium characteristics by means of varying at least one of temperature, pressure, and changing the immersion medium.
- 20. The method of claim 19, wherein the immersion medium characteristics are at least one of refractive index ( $n$ ) and lithographic constant ( $k$ ).